

WO 2005/020849 A2

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
10 March 2005 (10.03.2005)

PCT

(10) International Publication Number
WO 2005/020849 A2

(51) International Patent Classification⁷:

A61F

(74) Agent: ROCHE, Richard, T.; Quarles & Brady LLP, 411 East Wisconsin Avenue, Milwaukee, WI 53202 (US).

(21) International Application Number:

PCT/US2004/027926

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(22) International Filing Date: 27 August 2004 (27.08.2004)

English

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/498,832 29 August 2003 (29.08.2003) US

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71)

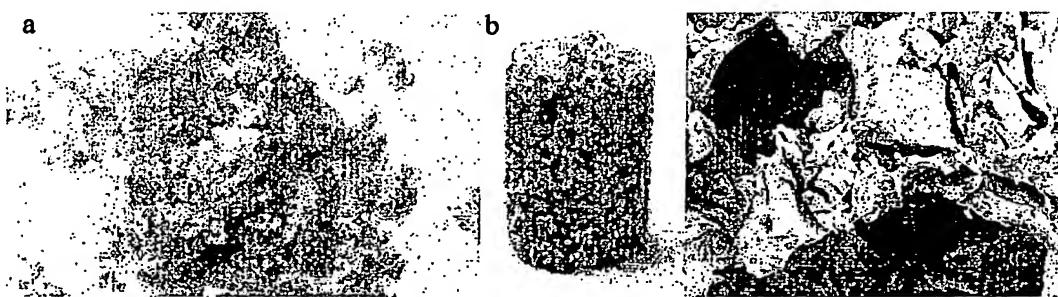
Applicant (for all designated States except US): MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH [US/US]; 200 First Street SE, Rochester, MN 55905 (US).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: HYDROGEL POROGENS FOR FABRICATING BIODEGRADABLE SCAFFOLDS



(57) Abstract: Hydrogel microparticles with entrapped liquid are used as the porogen to reproducibly form interconnected pore networks in a porous scaffold. In one embodiment, a biodegradable unsaturated polymer, a crosslinking agent, and a porogen comprising biodegradable hydrogel microparticles are mixed together and allowed to form a porous scaffold in a mold or in a body cavity. Example biodegradable unsaturated polymers include poly(propylene fumarate) and poly(ϵ -caprolactone-fumarate). The crosslinking agent may be a free radical initiator, or may include a free radical initiator and a monomer capable of addition polymerization. Example hydrogel microparticles include uncrosslinked or crosslinked collagen, an uncrosslinked or crosslinked collagen derivative, and an uncrosslinked or crosslinked synthetic biodegradable polymer such as oligo(poly(ethylene glycol) fumarate).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
10 March 2005 (10.03.2005)

PCT

(10) International Publication Number
WO 2005/020849 A3

(51) International Patent Classification⁷: C08J 9/00,
C08K 5/00

(21) International Application Number:
PCT/US2004/027926

(22) International Filing Date: 27 August 2004 (27.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/498,832 29 August 2003 (29.08.2003) US

(71) Applicant (for all designated States except US): MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH [US/US]; 200 First Street SE, Rochester, MN 55905 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): JABBARI, Esmaiel [IR/US]; 1117 7th Ave. SW, Rochester, MN 55901 (US). YASZEMSKI, Michael, J. [US/US]; 2806 15th Ae. SW, Rochester, MN 55902 (US). CURRIER, Bradford, L. [US/US]; 2005 Merrihills Drive SW, Rochester, MN 55902 (US). LU, Lichun [CN/US]; 734 27th Street NW, Rochester, MN 55901 (US).

(74) Agent: ROCHE, Richard, T.; Quarles & Brady LLP, 411 East Wisconsin Avenue, Milwaukee, WI 53202 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
14 July 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2005/020849 A3

(54) Title: HYDROGEL POROGENS FOR FABRICATING BIODEGRADABLE SCAFFOLDS

(57) Abstract: Hydrogel microparticles with entrapped liquid are used as the porogen to reproducibly form interconnected pore networks in a porous scaffold. In one embodiment, a biodegradable unsaturated polymer, a crosslinking agent, and a porogen comprising biodegradable hydrogel microparticles are mixed together and allowed to form a porous scaffold in a mold or in a body cavity. Example biodegradable unsaturated polymers include poly(propylene fumarate) and poly(ϵ -caprolactone-fumarate). The crosslinking agent may be a free radical initiator, or may include a free radical initiator and a monomer capable of addition polymerization. Example hydrogel microparticles include uncrosslinked or crosslinked collagen, an uncrosslinked or crosslinked collagen derivative, and an uncrosslinked or crosslinked synthetic biodegradable polymer such as oligo(poly(ethylene glycol) fumarate).